

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
13 May 2004 (13.05.2004)

PCT

(10) International Publication Number
WO 2004/040627 A3

(51) International Patent Classification⁷: **H01L 21/208**,
21/31, C23C 24/08, 24/10, H01L 21/336, C09D 11/00

(74) Agent: **ORSI, Alessandro**; Hewlett-Packard Española,
S.L., Legal Dept., Avda. Graells 501, 08190 Sant Cugat
del Valles (ES).

(21) International Application Number:
PCT/EP2003/050768

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,
CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,
MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,
SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 30 October 2003 (30.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0225202.1 30 October 2002 (30.10.2002) GB

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (*for all designated States except US*):
HEWLETT-PACKARD COMPANY [US/US]; Le-
gal Dept., 3000 Hanover Street, Palo Alto, CA 94304
(US).

Published:

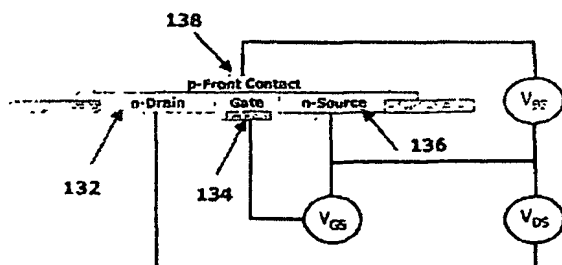
- *with international search report*
- *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

(72) Inventors; and
(75) Inventors/Applicants (*for US only*): **COLFER, Paul**
[IE/IE]; 95 Clonmich Wood, Tullamore, Co. Offaly (IE).
BYRNE, Lorraine [IE/IE]; 37 Warrenstown Drive, Blan-
chardstown 15, Dublin (IE). **CAHILL, Eugene** [IE/IE];
Firpark, Crossakiel, Kells, Co. Meath (IE). **KEENAN,**
Philip [IE/IE]; 9 Griffioen Glen Road, Griffioen Valley,
Lucan, Co. Dublin (IE). **STOBIE, Niall** [IE/IE]; 52 St.
Brendans Avenue, Coolock 5, Dublin (IE).

(88) Date of publication of the international search report:
10 February 2005

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: ELECTRONIC COMPONENTS



(57) Abstract: A method of manufacturing an electronic component comprising at least one n- or p-doped portion, comprising the steps of: co-depositing inorganic semi-conducting nanoparticles and dopant on a substrate, the nanoparticles being a group four element such as silicon or germanium; fusing the nanoparticles by heating to form a continuous layer; and subsequently; and, recrystallising the layer.

INTERNATIONAL SEARCH REPORT

Intern Application No
PCT/EP 03/50768

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L21/208 H01L21/31 C23C24/08 C23C24/10 H01L21/336
C09D11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C23C H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 106 712 A (EBARA CORP) 13 June 2001 (2001-06-13)	1,22,86, 87
X	abstract paragraphs '0013!, '0016!, '0028!	21,41,61
X	EP 1 223 615 A (EIDGENOESS TECH HOCHSCHULE) 17 July 2002 (2002-07-17) the whole document	21,41, 61,86,87
X	US 5 800 611 A (CHRISTENSEN HOWARD) 1 September 1998 (1998-09-01) abstract	21
A	EP 1 085 578 A (SEIKO EPSON CORP) 21 March 2001 (2001-03-21) the whole document	1-30, 41-49, 61-75, 86,87

-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

1 December 2004

Date of mailing of the international search report

15. 12. 2004

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Le Meur, M-A

INTERNATIONAL SEARCH REPORT

Ir

tional application No.
PCT/EP 03/50768**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
31-40, 50-60

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-30, 41-49, 61-75, 86, 87

Deposition of nanoparticles followed by an at least partial fusion of said nanoparticles.

2. claims: 31-40, 50-60

Suspension of nanoparticles in an ink.

3. claims: 76-83

Ink-jet deposition used to make portions of a transistor.

4. claims: 84,85

Definition of patterns by contact lithographic printing, with the electrical characteristics of said patterns depending on their geometries.

5. claim: 88

An apparatus with lithographic stamps allowing to deposit an hydrophilic liquid onto patterns.

INTERNATIONAL SEARCH REPORT

Intern al Application No

PCT/EP 03/50768

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 46 515 A (AGFA GEVAERT AG) 20 August 1998 (1998-08-20) abstract -----	31, 32, 34-40, 50-60
X	DE 198 45 496 A (ARGOTEC LACKSYSTEME GMBH) 6 April 2000 (2000-04-06) abstract -----	31-40, 50-60
X	US 5 989 700 A (KRIVOPAL BORIS) 23 November 1999 (1999-11-23) column 2, line 4 - line 24 -----	31, 32, 34-40
X	US 2002/149656 A1 (NOHR RONALD S ET AL) 17 October 2002 (2002-10-17) paragraphs '0023!, '0024!, '0097!, '0098! -----	31, 32, 34-40, 50-60

INTERNATIONAL SEARCH REPORT

Interr Application No
PCT/EP 03/50768

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1106712	A	13-06-2001	JP 2001158966 A EP 1106712 A1 TW 469492 B US 2003098531 A1 US 2001010837 A1	12-06-2001 13-06-2001 21-12-2001 29-05-2003 02-08-2001
EP 1223615	A	17-07-2002	EP 1223615 A1 US 2004137710 A1	17-07-2002 15-07-2004
US 5800611	A	01-09-1998	AU 9040198 A WO 9913136 A1	29-03-1999 18-03-1999
EP 1085578	A	21-03-2001	EP 1085578 A1 US 6767775 B1 CN 1297582 T WO 0059041 A1 TW 486824 B	21-03-2001 27-07-2004 30-05-2001 05-10-2000 11-05-2002
DE 19746515	A	20-08-1998	DE 19746515 A1	20-08-1998
DE 19845496	A	06-04-2000	DE 19845496 A1	06-04-2000
US 5989700	A	23-11-1999	AU 1151297 A CA 2241826 A1 DE 69608313 D1 DE 69608313 T2 EP 0871681 A1 ES 2145508 T3 WO 9725379 A1	01-08-1997 17-07-1997 15-06-2000 09-11-2000 21-10-1998 01-07-2000 17-07-1997
US 2002149656	A1	17-10-2002	AU 1184002 A AU 9648001 A CA 2420552 A1 CA 2424264 A1 EP 1324885 A1 EP 1324886 A2 JP 2004524381 T JP 2004525195 T MX PA03002851 A MX PA03002897 A WO 0228659 A2 WO 0228660 A2 US 2003021983 A1	15-04-2002 15-04-2002 11-04-2002 11-04-2002 09-07-2003 09-07-2003 12-08-2004 19-08-2004 14-07-2003 24-06-2003 11-04-2002 11-04-2002 30-01-2003